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Studies were some problems of learning motivation and extrinsic reinforcement in a group of disadvantaged youngsters. Also tested was the hypothesis that learning would be facilitated for those children who received regular individual tutoring in addition to classroom instruction, regardless of conditions of reinforcement. Subjects were 60 Negro fourth grade students in a ghetto school, randomly assigned to an experimental group receiving systematic material reinforcement and an experimental group receiving spontaneous verbal reinforcement. Both groups also received tutoring in arithmetic, while a control group did not. Results showed that social reinforcement and individual teaching were the most important factors in academic gains. Incentives in any form were equally reinforcing. "The Negro slum child may not require remediation as much as he may appropriate and effective teaching." (NH)

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THE EFFECT OF TUTORING ON CHILDREN'S LEARNING UNDER TWO CONDITIONS OF REINFORCEMENT: [redacted]

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Despite a revived interest in extrinsic reinforcement as a means for motivating children's learning, little experimental data are available from studies in applied settings (1). Although modern educators tend to resist using tangible reinforcement, preferring to rely on "intrinsic" motivation for facilitating learning, several studies suggest that socially disadvantaged youngsters learn better when tangible rewards like candy, toys, or money are used to reinforce learning behavior (2, 3, 4, 5). Further, it has been suggested that these youngsters may require individual tutoring to overcome learning lags produced by environmental deficit. The present study attempted to investigate some of these problems of motivation within the framework of real school learning. Its general design also permitted testing the additional hypothesis that learning, no matter what the conditions of reinforcement, will be facilitated for those disadvantaged children who, in addition to classroom instruction, receive regular individual tutoring.

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One of the problems confronting an investigation of motivation and learning relates to the fact that extrinsic and intrinsic reinforcement, as experimental variables, lack adequate definition. These terms frequently hold different meanings in different studies, so that comparison of results among studies lead to dubious and equivocal conclusions. For example, for some, extrinsic reinforcement is defined as any tangible or material reward such as money or candy, in contrast to intrinsic reinforcement which is held to mean any non-material reward including verbal praise or disapproval. Others, however, consider praise as an external reinforcer and would reserve the term "intrinsic" only for the internal "satisfaction" the subject derives from the performance of the task itself. For the purpose of clarity, therefore, the present study avoids this confusion by stating the problem in terms of whether the reinforcement was or was not contingent upon a predetermined appropriate response. In one condition, learning was reinforced by material reward of a behavior determined in advance by the tutor. This procedure was considered to approximate the now somewhat outworn method of the classroom in which gold stars were awarded for an "A" paper. In the second condition, verbal praise or disapproval was spontaneously used to motivate the learner, a method which enjoys a more favorable position in the typical classroom today.

A second problem centers around the more general issue of "pure" versus "applied" research. Because of the difficulties of locating and controlling critical variables central to motivation in the classroom, most of our understanding derives from laboratory studies of learning which rarely use school subject matter or are of long enough duration to allow meaningful extrapolations. Cronbach (6) has aptly cautioned against the benefits of miniature studies which have no relevance to understanding the cumulative development which is at the heart of educational psychology. Although a summary of the work cited would indicate that lower class children are more apt to require additional incentives in the form of immediate and tangible rewards in order to maintain interest in school, too few of these studies have used the subject matter of the classroom over a period of time comparable to learning in school. The need to investigate the problem of motivation and the value of individualized instruction for this population, together with the inherent shortcomings of laboratory conceived short range experiments led to the present study. Because it emerged in a social setting where the requirements of a research study were combined with a service orientation for severely deprived children, it was recognized from the start that certain critical variables would lack adequate control. However, the advantages of initiating this kind of research as a preliminary study appeared to outweigh its

limitations. It was felt that questions about general trends might emerge which could provide the background for future investigations.

METHOD

Subjects:

Sixty children were selected randomly from the total population of the fourth grade at Public School 129, a ghetto school in the Bedford-Stuyvesant section of Brooklyn, New York. The subjects were then randomly assigned to one of the following three groups:

Experimental Group I:	15 children receiving systematic material reinforcement
Experimental Group II:	15 children receiving spontaneous verbal reinforcement
Control Group III:	30 children receiving no tutoring

Tutors:

The children were tutored in arithmetic by six graduate students in the educational psychology program at Yeshiva University.[2]

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[2] This study originated as part of the graduate program in school psychology were students work in schools in conjunction with their university training. It could not have been accomplished without the competent and dedicated efforts of Miss Geraldine Barist, Miss Barbara Blum, Miss Sue Rosenberg, Mr. Norman Brier, Mr. Jerry Raphael, and Mr. Ralph Wise.

Procedure:

All children were pre-tested with the Stanford Achievement Test to determine level of achievement in arithmetic. Each tutor was then randomly assigned five children for tutoring. The tutors were randomly assigned to experimental treatment groups. Each of the children in the two experimental groups were seen for one-half hour, twice a week in a one-to-one tutorial session for a period of six months. Each tutor started at the level of the curriculum currently being used in the fourth grade. An analysis of the achievement test performance together with a critical appraisal of a given child's arithmetic ability soon led to an individualized program for each pupil. Although this resulted in different approaches to the material, both experimental groups adhered strictly to the general curriculum of the fourth grade as determined by the New York City Board of Education. Tutoring for Group I was accompanied by planned, systematic material reinforcement, while tutoring for Group II relied on spontaneous, unplanned reinforcement of the kind generally favored by proponents of "intrinsic motivation". The tutors kept anecdotal records on each child for each session to allow for an evaluation of qualitative data not likely to appear in test results. The level of achievement at the end of six months was determined by an alternate version of the same achievement test. Mean gain

scores were computed for each group and hypotheses comparing systematically with non-systematically reinforced groups, and tutored with control or non-tutored groups were tested by means of t tests for uncorrelated data. When conditions of comparison produced heterogeneous variance the critical value for t was independently calculated as recommended by Edwards (1960). Two-tailed tests were used throughout and the hypothesis of no difference was considered to be rejected if the probability associated with it was less than .05.

RESULTS

Table I presents the mean gain scores in academic months for each group of subjects. Achievement in arithmetic on the Stanford battery is reported in terms of two categories, arithmetic concepts and arithmetic computation. Since the study was interested in comparing tutored versus non-tutored groups, combined mean gain scores for both experimental groups (I and II) are also indicated.

Insert Table 1 about here

Comparisons between systematically reinforced and non-systematically reinforced groups are presented in Table 2, while comparisons between tutored and non-tutored subjects appear in Table 3.

Insert Tables 2 and 3 about here

The data show no significant difference between subjects who received systematic material reinforcement as compared with those receiving spontaneous verbal reinforcement. The most important finding is the substantial gain in arithmetic concepts observed for both groups of experimental subjects. Although the difference did not reach statistical significance in arithmetic computation, the data is suggestive of improvement in this area too.

Analyses of the anecdotal records emerging from each tutoring session are generally consonant with the numerical results. Both experimental groups showed consistent progress over the six month period with no apparent advantage for either of the motivating conditions. Qualitative evaluation of the records permitted several tentative conclusions relating to attitude on the part of the pupils as well as to a general teaching approach found to be most effective by each tutor. These may be summarized as follows:

> The approval of the tutor was an important source of reinforcement for children in both experimental groups. Many children in Group I, for example, forgot about trading tokens in for candy unless their tutors reminded them; and several youngsters verbally expressed their anger when tutors missed a session because of illness. The relationship itself between tutor and child, appears to have become a potent source of social reinforcement for both groups of children and no differences were noted between the groups.

In contrast to beginning sessions where many subjects in both groups were highly distracted and avoided work by play or conversation, these same children now came to their tutoring sessions equipped to work. Although the sessions frequently took place in noisy surroundings, the children were able and interested in maintaining their attention with the task for a greater part of the session.

In both groups, teaching was facilitated when the tutor used concrete materials and encouraged the handling of these materials by the children. Some tutors began teaching addition, e.g., by first counting with tooth picks. When transferring to paper, cues of this sort had to be faded out only gradually. Many children capable of doing long division, still made use of their fingers as aids in doing arithmetic.

Structure and consistency seem to have special importance for these youngsters. Drawing lines to separate columns, for example, allowed many children to be successful in adding columns of multi-digit numbers, where they would otherwise fail. Similarly, repetition became a significant element in teaching. Even when it appeared that a given child has mastered a unit of information or a given skill, forgetting frequently occurred at the next session. Repetition served the dual role of aiding in recall as well as in initial learning.

The greater number of children in this sample lacked knowledge and skills concerning fundamental concepts which are frequently assumed for children of this age. Some could not tell time. Some could demonstrate what "up- down" meant in a physical sense, but could not transfer this knowledge to paper. With some children, "next to" meant to the right, but they couldn't conceive of it as also meaning "next to" on the left. It was not possible to begin a tutoring session unless a realistic appraisal of existing skills was made.

Each child set his own pace and style in acquiring information. Hence general patterns of learning for disadvantaged children were not observed. This finding no doubt emerges from the individual approach the tutor used in relation to each child.

DISCUSSION AND SUMMARY

The findings of this study do not support the suggestion that material incentives are more effective than other strategies for reinforcing the learning of disadvantaged children. The results do indicate that the two most important factors for improved achievement were the social reinforcement afforded by the relationship between the tutor and his pupil, and a teaching curriculum realistically developed for a particular child's individual needs. These children responded well to supportive adults and were motivated to learn from them. Further, since no single particular learning pattern was observed, the implications are that disadvantaged Negro students are characteristically different from other children, both in how they learn or in the ways they may be motivated to learn deserves further investigation. If anything can be designated as typical or characteristic for this group, it appears to be a general lack of information, skills, and academic abilities normally assumed to constitute the attained repertoire of most children in other social settings.

Although the results offer positive support for individual tutoring as a means for overcoming serious achievement deficits in these children, the study suggests another interpretation for the success which the tutors reported. Analysis of the anecdotal

records indicates that tutoring in this study served a function which might otherwise be implemented within the classroom provided certain conditions were met. The most basic requirement is a clear understanding of precisely what a child knows and specifically what he does not know, with complete casting aside of a priori assumptions based on non-valid norms. If one instructs a child in fourth grade to "place a '2' next to the '6'", for example, it is not possible for the child to grasp the numerical concept being taught, if he does not understand the meaning of the words, "next to". Further, analysis of the pupil's skills requires parallel analysis of the subject matter being taught so that a mastery of simple steps can facilitate learning the more complex. If the curriculum of the grade calls for time-telling, the probability of learning is sharply decreased if the child cannot recognize the difference between the large and the small hands on the clock. Many of the fourth graders literally could not differentiate between the two hands of the clock. It has been our experience with the subjects of this study that although these assumed fundamentals were not present, teaching in the classes proceeded as if they were. This, in fact, could prove to be a significant variable in future research.

On the surface it may seem naive to emphasize this lack of critical examination on the part of educators as the focal reason

why a distressingly great percentage of slum children terminate their elementary school careers lacking even basal ability in the three "R's". Yet the anecdotal records strongly suggest that learning is possible when the ground rules for teaching are adapted to the existing level of the learner. Although many teachers do attempt to individualize teaching, gearing certain methods and some content to the needs of the child, they nonetheless seem bound to the limits of the curriculum for the grade they are teaching. In other words, although there may be individual variations in technique and content the boundaries of the curriculum for the grade are relatively inflexible. Further, too often, the deficit in the child is viewed in terms of some indwelling pathological condition, thereby implying the need for remedial techniques. The child's inability to recognize the difference between the small and large hands of the clock, for example, may then be attributed to "perceptual deficit" requiring special training before academic learning may proceed. Since there is no advantage to a label over a teaching method, it seems premature to prefer remediation to pedagogy. By labelling a child's deviation or deficit, we may be neatly sidestepping possible inadequacies of current teaching methods.

An equally convincing hypothesis is one that proposes the lack of skill to be the result of lack of experience. Since

most middle class children arrive at school armed with simple knowledges and skills already well established, such as comparing large and small similar objects, these skills are generally not taught. They are assumed. Of more importance is the fact that even if they are taught, they are not taught to the criterion of being well learned. Discrimination, to be sure, is an essential dimension of learning and is found in every readiness and primary grade program. The problem arises because teaching does not insure learning. "Shaping" behavior is only the preliminary step. The challenge for the teacher resides in maintaining the behavior and keeping it at a high level. All too often, these children are exposed to the next step without having mastered the simpler one. It was found in this study that Negro slum children showed substantial gains in arithmetic concepts as compared with a control group when curriculum was viewed as a sequence of planned events instead of solely as "material to be covered". Progress was also observed, though not statistically significant, for arithmetic computation. Obviously, many questions remain for future research in which the several variables under study may be better isolated. It remains to determine, for example, whether the tutoring experience or the individualized instruction could produce the results alone. If it is the latter, then we are faced with the task of implementing individual instruction within the structure of

the public school classroom. Up to now, individualized instruction as a concept has fared much better than as a practise and only recently have efforts been made to offer real help to teachers (7).

In summary, the study indicates that these children do respond to an individual relationship and can make academic gains when teaching begins with a realistic appraisal of their existing knowledge and capabilities and when teaching progresses at a pace the pupils can follow. Incentives in any form are equally reinforcing. The Negro slum child may not require remediation as much as he may appropriate and effective teaching. Whether tutoring is the necessary approach, or whether it is possible to implement other approaches within the classroom are important issues for educational research. The critical issue concerns the readiness with which educators can come to grips with the enormous task of educating a diverse and varying population of children.

TABLE I

MEAN GAIN SCORES ON STANFORD ACHIEVEMENT TEST IN MONTHS FOR ARITHMETIC CONCEPTS AND COMPUTATION

	N		M	S.E.
I. Tutored Group Non-Systematic	13	Arith. Concept	7.2307	2.5574
		Computation	4.0769	1.7919
II. Tutored Group Systematic	12	Arith. Concept	11.000	2.8603
		Computation	5.2500	1.6565
III. Non-Tutored Control Group	27	Arith. Concept	4.0370	1.3455
		Computation	2.1851	1.0768
I and II Tutored Groups Combined	25	Arith. Concept	9.0400	1.9100
		Computation	4.6400	1.2053

TABLE 2

A COMPARISON OF MEAN GAIN SCORES BETWEEN SYSTEMATICALLY AND NON-SYSTEMATICALLY REINFORCED GROUPS

	Non-Systematic	Systematic	t	Critical value for t at .05
Mean gain in concept achievement	7.2307	11.000	.9853	2.069
Mean gain in computation achievement	4.0769	5.250	.4783	2.069

TABLE 3

A COMPARISON OF MEAN GAIN SCORES BETWEEN TUTORED AND NON-TUTORED GROUPS

	Tutored	Non-Tutored	t	Critical value for t at .05
Mean gain in concept achievement	9.0400	4.0370	7.7717	1.479 [*3]
Mean gain in computation achievement	4.6400	2.1851	1.5232	2.008

* significant at .01 level

[3] t independently calculated to account for hetereogenity of variance.

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